Overview and Best Practices in Understanding and Interpreting Cost Data

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HEIST Workshop: Introduction to Economic Evaluation in Global Health
Recognition

• This presentation was prepared as part of the Global Health Cost Consortium and the World Bank Group.

• Special thanks go to Willyanne DeCormier Plosky and Lori Bollinger (Avenir Health) and Lorna Guinness (LSHTM).
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Questions we’d like to help answer

What do we mean by cost?

What do we use cost data for?

What makes a good quality cost estimate?

How can I understand if analysis of the cost estimate was done properly?

What is the Unit Cost Study Repository?

Where can I find more information?
What do we mean by cost?
What are costs?

Costing places a value on the total resources used to produce a [health] service

Output
(e.g., per test, per visit, per person treated per year)
Types of costs?

**Financial Costs** represent the *actual expenditure* on goods and services purchased.

- Used for budgeting; cost projections; expenditure reviews; affordability/budget impact analyses

**Economic Costs** are defined as the *opportunity cost* or *the value of resources used to produce something*.

- Whereas financial costs report expenditures, economic costs include the value of all resources used
- The *value* includes the value of donated goods, space, airtime, labor and subsidies
- Used for efficiency analyses; economic evaluation; budgeting/replication when context and conditions change
## The difference between economic and financial costs

<table>
<thead>
<tr>
<th></th>
<th>Financial cost</th>
<th>Economic cost</th>
</tr>
</thead>
<tbody>
<tr>
<td>Staff nurse who lives in free</td>
<td>Monthly salary plus transport allowance</td>
<td>Market price for nurses at national level plus transport allowance plus value of the accommodation</td>
</tr>
<tr>
<td>nursing accommodation</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Lay volunteer</td>
<td>None</td>
<td>Value of time in next best alternative</td>
</tr>
<tr>
<td>Syringe</td>
<td>Price paid for syringe</td>
<td>Market price for syringe</td>
</tr>
<tr>
<td>Patient coming in for clinical</td>
<td>Transport cost, meals on the way to the clinic,</td>
<td>Opportunity cost of patient’s time spent in transport and at clinic</td>
</tr>
<tr>
<td>assessment</td>
<td>childcare cost</td>
<td></td>
</tr>
<tr>
<td>Xpert diagnostic kit</td>
<td>Price paid</td>
<td>Full unsubsidised price including any distribution and tariff costs.</td>
</tr>
<tr>
<td>Computer - donated</td>
<td>None</td>
<td>Market price of computer</td>
</tr>
</tbody>
</table>
Cost Measures

Total Costs (TC): represent the cost of producing a service

*E.g.*, the total cost of active TB case finding at clinic A

Average costs/unit costs: total cost per unit of output (or TC/Q) with output being measured in different ways

*E.g.*, the cost per person contacted; or the cost per person tested

Marginal cost: the additional cost of producing one more unit of output (looking within a service or project)

*E.g.*, the cost of testing one more person or the cost or carrying out one more test

Incremental cost: additional cost of adding a new service or project

*E.g.*, the additional cost of adding active case finding to the current TB clinic services
What do we use cost data for?
1. Cost-effectiveness — Xpert for TB diagnosis

2. Disaggregated costs

Reference [1]

3. Strategic planning models also utilize cost data, including the Spectrum Goals/RNM modules and the AEM model for HIV, and the Optima TB model for TB. These models often have default cost data, but the default values are editable. So, users often ask, should I change the data? And how?
4a and 4b. Scale efficiency

Unit costs of the same program vary by scale, most likely in a nonlinear fashion, making it important to use different unit costs for different service delivery levels.

Reference [3]

Reference [4]
The purpose of the analysis dictates the type of cost data

**Budgeting**
- Financial costs
  - Some funders require full economic costing

**Forecasting**
- Economic costs
- Financial costs

**Efficiency**
- Economic costs

**Priority setting**
- Economic costs

Mathematical models help address these purposes using cost data (either unit or marginal or incremental) together with epidemiologic and program data.

What was spent? How much will you spend?

What will be the financial requirements? What resources are required?

How are resources being used? How should they be used?
What makes a good quality cost estimate?
What makes a good quality cost estimate?

1. Generalisable
2. Transferable
3. Consistent

Statistical properties
- Precision
- Accuracy

Other properties
- Transparent
- Reliable
- Consistent

https://youtu.be/_LL0uiOgh1E
Set of guiding principles to improve cost estimates

Describes best methodological practice’ to support a cost estimation process that is fit for purpose and efficient given the funding and data available.

Sets minimum reporting standards to improve the transparency of cost estimation
Principles of Costing

- Study Design
- Analyse and present results
- Measure resource use
- Value resources used
### Study design (Principles 1–5)

Specify the **purpose** to define:

<table>
<thead>
<tr>
<th>Perspective (whose costs?)</th>
<th>Types of cost?</th>
<th>Cost measure</th>
<th>Unit of service</th>
<th>Time horizon and period</th>
</tr>
</thead>
<tbody>
<tr>
<td>Health system</td>
<td>Financial/Economic</td>
<td>Full</td>
<td>Standardised units for different disease and intervention areas</td>
<td></td>
</tr>
<tr>
<td>Provider</td>
<td>Real world/guideline</td>
<td>Incremental</td>
<td>Episodes of care/ Unit of service use</td>
<td></td>
</tr>
<tr>
<td>Society</td>
<td></td>
<td>Marginal</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Patient/client</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Household</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

- **What is the time horizon you will be projecting to?**
- **What time periods need to be captured to be representative?**
Two examples...

<table>
<thead>
<tr>
<th>Cost-effectiveness of TB active case finding</th>
<th>Budget for ART in district Q over the next two years</th>
</tr>
</thead>
<tbody>
<tr>
<td>▪ Most Ministries of Health would demand that the economic evaluation takes a societal perspective.</td>
<td>▪ A provider perspective would be used as we are informing the budget; and</td>
</tr>
<tr>
<td>▪ Economic costing would be required to ensure that we capture the true opportunity cost</td>
<td>▪ Financial costs only — actual expenditures — would need to be included.</td>
</tr>
<tr>
<td>▪ Real world costing would be preferable to avoid any systematic bias.</td>
<td>▪ Real world costs would be the most accurate way to budget but guidelines maybe sufficient and</td>
</tr>
<tr>
<td>▪ An incremental cost would be used and economic evaluation guidance would indicate whether future savings should be incorporated.</td>
<td>▪ The full costs of the service needed.</td>
</tr>
<tr>
<td>▪ The time frame needs to be sufficient to cover the cost of the intervention (direct and indirect).</td>
<td>▪ The time frame will be 2 years</td>
</tr>
</tbody>
</table>

More examples available at the Reference Case: www.ghcc.org
Principles of Costing

- Study Design
- Analyse and present results
- Value resources used
- Measure resource use
Measuring resource use: scope of the costing

- Describe the intervention/programme fully
- Identify the activities for the specific intervention/programme during the specified time for the specific in that context.
- Identify the inputs that are required for each activity
- Identify the outputs for each activity
The GHCC reference case framework

Intervention
- e.g. Provision of PMTCT

Services
- Direct service activities
  - Antenatal care clinic
  - HIV testing
  - Counselling
  - Provision of ART
- Ancillary service activities
  - HIV test laboratory costs
  - Information and education campaign
- Operational activities
  - e.g. training, monitoring

Inputs, resource use and prices
- Quantity and price of labour
- Quantity and price of consumables
TB active case finding (simplified)

Intervention
Cost per person tested

Direct and Ancillary Service Activities

Direct service
- Q(visits) x Cost per household visit
- Q(visits) x Cost per outpatient visit or inpatient visit

Ancillary/support services
- Q(events) x Cost per community event
- Q(tests) x Cost per test (by each technology)

Activity costs

Personnel – Q(minutes) x cost per minute
Infrastructure – Q(sq m per min) x cost per sq meter
Personnel – Q(minutes) x cost per minute
Technology – Q(tests) x cost (infrastructure, consumables, overheads transport, training)
Measuring resource use: assessing sampling

- Sampling can be at individual or facility level
- Sampling frame will be determined by precision demanded
- Explicit consideration of each element inline with good practice
- Transparency!
- Look for sampling from:
  - Multiple sites
  - Real world (rather than clinical trials)
Methods of measurement: gross or microcosting?

Example: The gross costing approach to estimate the portion of inputs used in TB case finding from overall inputs at the facility.

- Total inputs (Facility level)
  - Department A
    - Service 1
  - Ancillary department
    - Service 2
  - Department B e.g. TB clinic
    - Service 3 e.g. TB case finding

Document the process — be transparent!
Measuring outputs

- Outputs need to be measured at the different levels of analysis
- Intervention (e.g. case diagnosed); Service (e.g. outpatient visits, tests carried out, monitoring visits completed)
- To ensure comparability, **standardized output units** are needed
- Standardized units TB diagnosis and treatment are available at the GHCC reference case, and those for HIV are forthcoming.
- Sources include facility or patient surveys, routine data and even focus groups

Remember to report the source of data, report the approach used to sample/fill missing data and justify the approach
Principles of Costing

- Study Design
- Analyse and present results
- Measure resource use
- Value resources used
Financial costs use expenditures for prices

Economic costs use market prices or shadow prices (where there is no recorded expenditure)

All costs are converted to constant prices using appropriate inflation index (usually a GDP deflator)

Capital costs should be discounted (financial costing) and amortized [annualized] for economic costing.

Valuations in local currency and US dollars.

Any analysis should document the adjustments and sources of any data used
Principles of Costing

- Study Design
- Measure resource use
- Value resources used
- Analyse and present results
Analysing and presenting results

- Explore heterogeneity
- Characterise uncertainty
- Communicate results transparently
Exploring heterogeneity

Has heterogeneity been explored? If only one cost figure is presented, it may mask differences in cost between:

- Technologies (drugs, tests, surgical vs. device, radio vs. social media, etc.)
- Service delivery platforms
- Target populations
- Geographic areas
- Seasons

Table 4 Unit costs of detailed NGOs by Typology (Economic costs 3%)

<table>
<thead>
<tr>
<th>Typology</th>
<th>Population estimation</th>
<th>Cost per population reached</th>
<th>Cost per contact</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>05-06</td>
<td>06-07</td>
<td>07-08</td>
</tr>
<tr>
<td>Brothel-based</td>
<td>104</td>
<td>107</td>
<td>121</td>
</tr>
<tr>
<td>Street-based</td>
<td>100</td>
<td>123</td>
<td>124</td>
</tr>
<tr>
<td>Bar girls</td>
<td>98</td>
<td>86</td>
<td>97</td>
</tr>
<tr>
<td>HR-MSM</td>
<td>123</td>
<td>145</td>
<td>145</td>
</tr>
<tr>
<td>Hijiras</td>
<td>-</td>
<td>101</td>
<td>107</td>
</tr>
<tr>
<td>HR-MSM site in Karnataka</td>
<td>26</td>
<td>63</td>
<td>78</td>
</tr>
<tr>
<td>FSW site in Karnataka</td>
<td>35</td>
<td>58</td>
<td>72</td>
</tr>
</tbody>
</table>

References:
- Reference [4]
- Reference [5]
Characterizing uncertainty

- Sampling that may reflect higher- or lower-cost sites or populations disproportionately, and have more or less precision.
- Completeness — what elements of costs are missing (inputs, service use, providers).
- Possible under- or over-reporting of elements such as service and time use due to the data collection methods or program features.
- Distortions or incompleteness in the prices of inputs.

While it may not always be feasible to quantify bias, the characteristics and direction of any bias should be reported in the study limitations.

Cost data reporting needs transparency around each principle described in the Reference Case, so that the data may be interpreted correctly.
The Unit Cost Study Repository: a resource to complement the Reference Case
Need for ACCESS to centralized cost data source, with information to assess the QUALITY of cost estimates, without overwhelming the user with data.

Need for ability to sort data by key characteristics: region, country, type of intervention, platform, etc.

Includes 2,577 unit costs from 340 studies up until mid-year 2016 for HIV and TB.
Choose your intervention in Step #1 and view results. Step #2 allows you to further refine your search.

More detailed information is available by clicking on any row.

The display and filters align with the Reference Case Principles.

Visualize your results through charts in Step #3.
Thank you!

You may find the Reference case and the UCSR at ghcosting.org

The UCSR pages include a Methodology description, a User Guide, and a link to a Feedback Survey in the main headings at the top of the page.

You may also send questions to contactGHCC@gmail.com

* Please note, more resources and links are available in the actual presentation that you can download online from the event website.
References in this module


